

The female approaches that sex of *T. dispar*, Grose-Smith, but the white bands on both wings are very much broader. It is a smaller insect than any of the above-mentioned species.

*Thysonotis zuleima*.

*Male*—*Upperside* more greenish blue than *T. zuleika*; anterior wings with the costal margin at the base and the outer margin more broadly black, and the central white band is not irrorated by blue scales.

On the *underside* of the anterior wings the blue band which traverses the outer marginal black area is narrower along the outer margin than in *T. zuleika*; on the posterior wings the inner edge of the submarginal blue band is lunulate between the veins, and the black spots in it are larger than in *T. zuleika*.

*Female*.—*Upperside* closely resembles the same sex of *T. zuleika*, but on the anterior wings the apical area is not tipped with white, and the white band which crosses the middle is more oblique.

On the *underside* the apex of the anterior wings is not tipped with white, and on the posterior wings the submarginal blue band is also lunulate on its inner edge, the spots in this band being likewise larger. Cilia rather broadly white, crossed by grey at the ends of the veins.

Expanse of wings  $1\frac{5}{8}$  inch.

*Hab.* St. Aignan Island (*Meek*).

In the collections of Mr. Grose-Smith (types, ♂ ♀) and the Hon. Walter Rothschild.

This species is closely allied to *T. zuleika*, but the different colouring of the male, the absence of the white tips on the anterior wings of the female, and other distinctions are sufficient to separate them.

XLVII.—*Notes on some Type Specimens of Cretaceous Fishes from Mount Lebanon in the Edinburgh Museum of Science and Art.* By A. SMITH WOODWARD, F.L.S.

THE descriptions and figures given in the memoir on the Cretaceous fishes of Mount Lebanon by the late Mr. James W. Davis\* are scarcely adequate for the purposes of ichthyology. To understand this important extinct fish-fauna it is necessary

\* J. W. Davis, "The Fossil Fishes of the Chalk of Mount Lebanon, in Syria," *Trans. Roy. Dublin Soc.* [2] vol. iii. (1887), pp. 457-636, pls. xiv.-xxxviii.

to examine the original specimens further and determine their essential features; moreover, it is desirable in connexion with them to make a renewed study of some of the type specimens described by Pictet and Humbert\* in the Natural History Museum at Geneva. I have recently been attempting this task, so far as the Physostomous Teleosteans are concerned, and the general results will shortly be summarized in the fourth volume of the British Museum Catalogue of Fossil Fishes. The majority of the specimens described by Davis are to be found in the British Museum, and will thus be noticed in detail in the official work just mentioned. A considerable number, however, are now preserved in the Edinburgh Museum of Science and Art, and some of them seem to demand detailed description elsewhere. The following notes relate to the latter specimens, and furnish, so far as their fragmentary nature will permit, the essential characters by which to determine their systematic position. Through the kindness of Dr. Traquair, to whom I would express my best thanks, I have received the whole series on loan from Edinburgh, and have thus been able to make direct comparisons with the similar collection in London.

1. *Osmeroides megapterus* (Pictet), J. W. Davis, *loc. cit.* p. 557, pl. xxxii. fig. 4. [= *Sardinius crassapinna*, Davis.]

From an examination of Pictet's type specimen of *Osmeroides megapterus* in Geneva I am convinced that this species is referable to the genus *Sardinioides* of W. von der Marck †, which has the pelvic fins large, but the pectoral fins rudimentary or absent. It is thus evident that both of the specimens figured by Davis under the same specific name are wrongly determined. The second (*loc. cit.* pl. xxxii. fig. 6) is clearly an example of *Osmeroides* (regarding the English *O. lewesiensis* as type), as indicated by its branchiostegal rays, gular plate, fins, and scales. The first (*loc. cit.* pl. xxxii. fig. 4), however, belongs to another genus and requires further consideration.

The latter specimen exhibits remains of a series of about ten branchiostegal rays beneath the head, all very slender except the two uppermost. The abdominal vertebræ must have been approximately 20 in number, and the ribs do not appear to have completely encircled the abdominal cavity. The caudal vertebræ are shown to have been 19 or 20 in

\* F. J. Pictet, "Description de quelques Poissons Fossiles du Mont Liban" (1850); Pictet and Humbert, "Nouvelles Recherches sur les Poissons Fossiles du Mont Liban" (1866).

† Palæontogr. vol. xi. (1863), p. 45.

number, with moderately robust arches. Behind the clavicular arch there are traces of smooth, expanded, postclavicular plates, while the pectoral fin, which exhibits about 18 rays, is truncated distally, and when adpressed would probably reach the insertion of the pelvic pair. The pelvic fin preserved is about two thirds as large as the pectoral, and shows 8 stout rays, all divided distally. The dorsal fin arises considerably further from the caudal fin than from the occiput, opposite the origin of the pelvic pair. Its two foremost rays are slender spines, the second longer than the first; the third ray is still longer and articulated, though not divided, distally; the following rays, which are at least ten in number, but too crowded for precise counting, are all both divided and articulated distally, and gradually decrease in length backwards. The anal fin is shown to be two thirds as elevated as the dorsal, and about 16 supports can be counted at its base. The caudal fin is very deeply forked. The squamation seems to have been uniform, all the scales cycloidal and deeply overlapping.

An example of the same species in the British Museum (no. 48155*b*), which is considerably elongated by distortion, is important as having the mouth widely open, and thus displaying the jaws. Nearly the whole of the upper border of the gape is shown to be formed by the stout arched maxilla, which bears a single close series of minute conical teeth, and above this bone there are two large supramaxillaries, as in the herring. Impressions of teeth like those of the maxilla are also seen on the border of the dentary bone.

A third specimen, apparently of the same fish, in the Edinburgh Museum, is described and figured (*loc. cit.* p. 567, pl. xxxii. fig. 5) as the type of *Sardinius crassapinna*, Davis. A direct comparison of this fish with the original of fig. 4 seems to leave no doubt that their differences are due solely to accidents in preservation and the mode of crushing. The so-called *S. crassapinna* is evidently much shortened, while the specimen now under consideration is shown to be somewhat elongated by distortion. They may thus be placed in one and the same species.

Assuming that this determination of the specific identity of the three specimens just mentioned is correct, it becomes clear that although the jaws of *Sardinius crassapinna* resemble those of the typical *Osmeroides*, the fish is distinct from the latter genus at least in the slenderness of its branchiostegal rays, the comparatively small number of its abdominal vertebræ, and the relatively large size of its paired fins. It is indeed in all these respects generically identical

with *Sardinius macrodactylus* of W. von der Marck \*; but whether or not the latter is correctly placed in the same genus as the typical *Sardinius Cordieri* is a question that admits of further discussion.

2. *Clupea elongata*, J. W. Davis, *loc. cit.* p. 581, pl. xxxiii. fig. 2. [= *Thrissopteroides tenuiceps*, sp. n.]

The head in the type specimen of this species is so much crushed and distorted that its characters can only be very imperfectly observed. The mandibular articulation, however, appears to be beneath the hinder margin of the orbit, and the finely toothed border of both maxillæ can be distinguished, that of one side in almost complete impression, that of the other side only partly exposed. The former is erroneously described by Davis as a series of "minute orifices, where numerous teeth have been attached." The axial skeleton of the trunk is slender, the ribs being especially delicate, but completely encircling the abdominal cavity. The vertebræ are approximately 60 in number, and about 18 may be regarded as caudal. As shown by the original figure, the pelvic fins are only about half as large as the pectoral pair and arise considerably behind the middle point of the trunk. The rather elevated dorsal fin, with about 12 or 14 rays, is directly opposed to the space between the pelvic and anal fins. The anal fin is comparatively low and delicate, with about 15 rays. The length of the head with opercular apparatus is twice as great as the maximum depth of the trunk and contained about three times in the length from the pectoral arch to the base of the caudal fin. There are no traces of ridge-scales.

As shown by the general characters of the skeleton, this fish is closely related to *Spaniodon*, and a second specimen, evidently of the same species, in the British Museum (no. 49592) exhibits the characteristic enlarged tooth at the anterior end of the dentary. The fine denticulation of the maxilla, however, and the position of the dorsal fin remove the fish from *Spaniodon* to the allied genus *Thrissopteroides* †, in which it forms a new species requiring a name. The type species of *Thrissopteroides* is termed *T. elongatus*, so that it is necessary to propose a new name for the species now described, *T. tenuiceps*.

3. *Clupea pulchra*, J. W. Davis, *loc. cit.* p. 578, pl. xxxiii. fig. 3. [= *Thrissopteroides pulcher*.]

This very small fish, evidently of the same genus as the

\* Palæontogr. vol. xi. (1863), p. 44, pl. vi. fig. 1.

† W. von der Marck, Palæontographica, vol. xxii. (1873), p. 61.

preceding species, differs from all the known forms of *Thrissopteroïdes* in its general proportions; the length of the head with opercular apparatus not much exceeding the maximum depth of the trunk and contained nearly three times in the length from the pectoral arch to the base of the caudal fin. The axial skeleton and fins are essentially identical with those of the last species, and there are no ridge-scales.

4. *Clupea curta*, J. W. Davis, *loc. cit.* p. 579, pl. xxxiii. fig. 5. [= *Osmeroïdes*, sp.]

The crushed and distorted fragment thus described is clearly excluded from the genus *Clupea* by the shortness of its ribs and the absence of ventral ridge scutes. It is, however, too imperfect for precise determination. The axial skeleton is most suggestive of that of *Osmeroïdes*, and it is quite possible that the fossil may belong to the species of this genus to which Davis gave the name of *Clupea Lewisii* (*loc. cit.* p. 571, pl. xxxiii. fig. 1).

5. *Clupea attenuata*, J. W. Davis, *loc. cit.* p. 580, pl. xxxiii. fig. 4. [= *Osmeroïdes attenuatus*.]

The cranium in this specimen is almost completely destroyed, but the parasphenoid is shown to be straight and comparatively stout. Below this are remains which may perhaps be interpreted as a fragment of a stout maxilla. As noted by Davis, the mandible exhibits traces of very minute clustered teeth at its symphysial end, while the outer face of the dentary is marked by two irregular longitudinal series of pits, evidently connected with the sensory canal. Between the mandibular rami there are fragments which might be parts of a gular plate; but this is uncertain. The opercular apparatus of the right side is imperfectly exposed from within, and there seem to be traces of a much-expanded preoperculum marked with radiating ridges. The vertebral axis is much obscured by the thick squamation; but the centra in the anterior abdominal region are shown to be comparatively short and deep, while those in the caudal region are a little elongated. The stout neural spines in the anterior abdominal region seem to be separate from their supporting arches, and the ribs clearly do not completely encircle the abdominal cavity. The stout neural and hæmal arches in the caudal region are sharply inclined backwards. The total number of vertebræ is approximately 35 in the abdominal, 20 in the caudal region. Remains of one of the pectoral fins prove these to have been small and delicate, while the insertion of the pelvic fins is shown to have been opposite the

anterior half of the dorsal, midway between the pectorals and the anal. The short dorsal fin is depressed and the number of its rays cannot be counted; its origin is nearly as far from the occiput as is its hinder end from the base of the caudal fin. The anal fin, also depressed in the fossil, is shown to have been very small, arising somewhat nearer to the caudal fin than to the pelvic pair. The large caudal fin is clearly forked. It is difficult to determine the characters of the squamation; but a careful study of the specimen proves the scales to be cycloid, moderately large, and very deeply overlapping. The large overlapped area is truncated at the front border and is marked by a few deep furrows slightly radiating forwards from the centre of the scale. These furrows give the false appearance of elongated scales described by Davis "on the abdominal surface." There are no traces of thickened ridge-scales.

The fish thus described cannot belong to the genus *Clupea*, and no characters are known by which it can be separated from the Cretaceous Elopine genus *Osmeroides*. It differs from all the known species of the latter in its general proportions, the length of the head with opercular apparatus considerably exceeding the maximum depth of the trunk and contained nearly three times in the length from the pectoral arch to the base of the caudal fin.

6. *Engraulis* (?) *tenuis*, J. W. Davis, *loc. cit.* p. 583, pl. xxx. fig. 4. [= *Telepholis* (?) *tenuis*.]

The type specimen of this species described by Davis is exposed from the dorsal aspect as far back as the anterior end of the caudal region, which is displayed in side view. The cranium is shown to be long and narrow, while the right quadrate bone and other remains prove that the mouth was small, the mandible not being more than half as long as the skull. There are no clear indications of teeth. All the vertebral centra seem to be slightly longer than deep; they are delicate constricted cylinders, which must have been pierced by a continuous notochord, the space for the latter being filled with calcite in the abdominal region of the fossil, still hollow in the caudal region. There are about 26 abdominal vertebræ, each bearing a pair of robust transverse processes and short delicate ribs. The caudal vertebræ are somewhat fewer, perhaps 21, and the neural and hæmal spines are both short and slender. The pectoral fins comprise about 16 delicate rays, all divided and articulated distally, and the longest, in the middle of each fin, are as long as the head with opercular apparatus. The pelvic fins are inserted



upon expanded pelvic bones within the anterior quarter of the space between the pectoral and caudal fins, and that of the right side is shown to comprise 7 rays, of which the anterior two are stoutest and very closely articulated distally, while the others are both divided and articulated distally. The dorsal fin arises opposite a point midway between the paired fins, and is borne by very large triangular supports, which expand downwards as they approach the vertebral column; most of the rays are shown to be both divided and articulated distally, but they are too much crushed for precise counting, although probably about twelve in number as mentioned by Davis. The anal fin is destroyed and the caudal is only imperfectly preserved. The rays of the latter, however, are clearly divided and articulated distally, and the fin must have been forked. There seem to be traces of cycloidal scales over part of the fossil, but their precise characters are not distinguishable.

This fish is excluded from *Engraulis* by the proportions of the mouth, and both from *Engraulis* and from the family Clupeidæ by the characters of the abdominal vertebræ. It has been referred to the genus *Exocætoides* of Davis by Kramberger \*; but it is distinctly separated from the latter by its more numerous vertebræ, its divided median fin-rays, and its forked tail. It seems to me to belong most probably to the genus *Telepholis* of W. von der Marck †, with which it agrees in every essential character that can be compared; but unfortunately the jaws and dermal armature are not clear in the unique specimen of the Lebanon fish, and its generic determination thus remains provisional. One of the Westphalian type specimens of *Telepholis* in the Münster Academy exhibits a characteristically Scopeloid upper jaw. Its cycloidal dorsal scales, each with a median tubercle, have already been noticed by von der Marck.

7. *Engraulis tenuis*, J. W. Davis, *loc. cit.* p. 635, pl. xxx.  
fig. 5. [= *Prionolepis cataphractus*.]

The second specimen referred by Davis to the so-called *Engraulis tenuis* without description, is the counterpart of a small example of *Prionolepis* (or *Aspidopleurus*) in the British Museum (no. P. 4871), which seems to be an immature individual of *P. cataphractus*. Though not indicated in the drawing, the complete series of characteristic lateral scutes is well shown in impression, while the proportions and

\* Gorganovic Kramberger, "De Piscibus Fossilibus," Djela Jugoslav. Akad. xvi. (1895), p. 39.

† Palæontogr. vol. xv. (1868), p. 276.

arrangement of the fins are precisely as in the larger typical specimens of *P. cataphractus*. The pelvic fins are about as large as the pectorals, though with fewer rays, the former comprising only 8, while the latter exhibit approximately 14 rays. The dorsal fin is very imperfect, but clearly shows 14 or 15 rays, while the anal is relatively small, but also comprises about 14 rays.

8. *Spaniodon hakeleensis*, J. W. Davis, *loc. cit.* p. 591, pl. xxxiv. fig. 4. [= *Charitosomus hakeleensis*.]

In the type specimen of this species the long and low cranium is exhibited chiefly in longitudinal section, and the stout parasphenoid is slightly arched, the concavity being downwards. Remains of the delicate and toothless pterygoquadrate arcade are seen, proving the mandibular suspensorium to be much inclined forwards, with the mandibular articulation below the anterior margin of the orbit. The mandible, shown chiefly in impression, is remarkably short and deep, the height of the coronoid region apparently equalling nearly two thirds of the total length of the jaw; and although the impression may be imperfect in front, it is clear that the gape of the mouth must have been very small. Below the end of the rostrum and above the mandible there is a large stout arched bone, which must have been either maxilla or premaxilla, and its form specially recalls the maxilla of the Gonorhynchidæ. Below and behind the mandibular articulation an obscure fragment of bone bears a cluster of smooth, rounded, grinding teeth of unequal and irregular size; and there seem to be traces of similar teeth obscured by the pterygoid bones immediately beneath the parasphenoid. The opercular apparatus is too imperfect for description, and there are only fragments of a few broad branchiostegal rays. The axial skeleton of the trunk is well exposed and comprises about 42 vertebræ, of which 14 are caudal. The centra are much constricted, about as long as deep, with very stout neural arches throughout the column and similar hæmal arches in the caudal region. All the neural spines seem to be firmly fused with their supporting arches, and the four foremost spines in the abdominal region are expanded into distally truncated laminae, while a few of the succeeding spines are also a little broad. The ribs are very delicate and do not completely encircle the abdominal cavity. The neural and hæmal arches in the caudal region are slender, except close to the base of the caudal fin, where they become longer and stouter. The hæmals do not appear to fuse into a hypural bone at the base of the caudal fin.



There are remains of short intermuscular bones above the vertebral column throughout its length and also beneath it in the caudal region. None of the fins are remarkably large, but the pelvic pair is not much inferior in size to the pectorals. The pelvic fins arise opposite the middle of the dorsal, somewhat nearer to the anal than to the pectorals, and each seems to comprise seven rays, the foremost articulated, the others both articulated and divided distally. The dorsal fin comprises 12 rays, and their supports exhibit small laminar expansions; its origin is about as far from the occiput as its hinder end from the base of the caudal fin. The anal fin, with 7 rays, is comparatively small and arises slightly nearer to the caudal than to the origin of the pelvic pair. The caudal fin is very stout and somewhat forked, with a few short fulcral rays at its base above and below. The squamation is delicate and does not appear to extend over the head. It is impossible to determine the form of the scales with certainty, but appearances suggest that they are comparatively small and antero-posteriorly elongated.

The form of the jaws and branchiostegal rays, the presence of grinding-teeth, the shortness of the ribs, and the noteworthy expansion of the foremost neural arches are characters indicating that this fish does not belong to the genus *Spaniodon*. The composition of the upper jaw is uncertain; but comparison of the stout upper lateral bone with *Gonorhynchus* and *Notogoneus*, of the family Gonorhynchidæ\*, suggests that it is a maxilla of the same type as in the latter genera, excluded from the border of the mouth. The great depth of the mandible is also paralleled in these small-mouthed Gonorhynchid fishes, but its characteristic shape cannot be distinguished. The inner teeth resemble those of *Gonorhynchus*. The expansion of the anterior neural spines is exactly similar to that observed in *Notogoneus*. The vertebral column and fins also resemble those of the latter genus, except that the abdominal vertebræ are fewer. The squamation, though obscure, might also be interpreted as resembling that of the Gonorhynchidæ in character; but there are no traces of its extension over the head.

It thus seems extremely probable that the so-called *Spaniodon hakelensis* is a Gonorhynchid fish, differing from the Tertiary and Recent members of the family in the absence of scales on the head. It appears to belong to the same genus as *Charitosomus formosus* † from the Upper Cretaceous

\* Smith Woodward, "On some Extinct Fishes of the Teleostean Family Gonorhynchidæ," Proc. Zool. Soc. 1896, pp. 500-504, pl. xviii.

† W. von der Marck, Palæontogr. vol. xxxi. (1885), p. 257, pl. xxiv. fig. 1.

of Westphalia, though the only known specimen of the latter is unfortunately too imperfect for precise comparison. The so-called *Solenognathus lineolatus*\*, from Sahel Alma, will also most likely prove to be a smaller species of the same generic type when its osteology is more fully known.

XLVIII.—*Descriptions of Two new Snakes from Queensland.*  
By G. A. BOULENGER, F.R.S.

*Typhlops Broomi.*

Snout rounded, very prominent; nostrils lateral. Rostral nearly half the width of the head, truncate posteriorly, extending to the level of the eyes; nostril between two nasals, the anterior in contact with the first and second labials; a præocular, much narrower than the ocular, in contact with the second and third labials; eyes perfectly distinct; præfrontal, supraocular, and parietal scales distinctly enlarged; four upper labials. Diameter of body 40 times in the total length; tail a little longer than broad, ending in a spine. 20 scales round the body. Pale buff above, with 11 brown streaks following the series of scales, white beneath.

Total length 125 millim.

Allied to *T. Guentheri*, Ptrs., and *T. leucoproctus*, Blgr.

A single specimen from Muldiva.

*Pseudelaps albiceps.*

Eye longer than its distance from the mouth. Rostral large, rather prominent, twice as broad as deep, the portion visible from above measuring two thirds its distance from the frontal; internasals nearly as long as the præfrontals; frontal once and a half as long as broad, longer than its distance from the end of the snout, as long as the parietals; nasal entire, separated from the præocular by the præfrontal; one præ- and two postoculars; temporals 2 + 2; six upper labials, third and fourth entering the eye; two pairs of subequal small chin-shields, the anterior in contact with three lower labials. Scales in 15 rows. Ventrals 141; anal divided; subcaudals 20. Body yellow (red?) above, white beneath; head white, snout and lips speckled with black; a  $\blacktriangle$ -shaped black band between the eyes and a black spot behind each eye; a large black blotch on the nape.

Total length 160 millim.; tail 14.

A single specimen from Port Douglas.

The two snakes here described were obtained in Northern Queensland and presented to the British Museum by Dr. R. Broom.

\* Pictet and Humbert, *op. cit.* p. 56, pl. iv. figs. 4-7.